

# High Performance Metals for Industry

High Strength, High Temperature and Corrosion-Resistant Alloys



**Allegheny Ludlum**

*An Allegheny Technologies Company*

**1993** Acquisition of Jessop Steel makes Allegheny Ludlum a fully integrated producer of specialty steel plate products

**1996** Allegheny Ludlum and Teledyne combine and become Allegheny Teledyne Incorporated. The specialty metals group includes Allegheny Ludlum, Allvac, Rodney Metals and Wah Chang

**1998** Allegheny Teledyne acquires aerospace division of Sheffield Forgemasters

**1998** Allegheny Teledyne acquires Oregon Metallurgical Corporation (OREMET<sup>®</sup> Titanium)

**1999** Allegheny Technologies Incorporated is formed consisting of Allegheny Ludlum, Allvac, Wah Chang, Rome Metals, Metalworking Products, Casting Service, and Portland Forge

Allegheny Technologies manufactures flat-rolled titanium products through Allegheny Ludlum, and long titanium products through its Allvac operation.

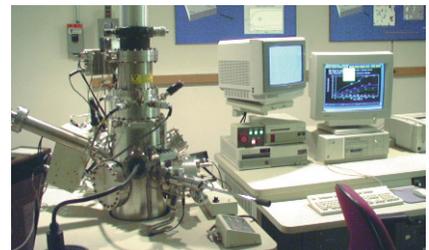
Allegheny Technologies has facilities to Vacuum Arc Remelt (VAR), Electron-Beam Cold Hearth Refine (EBCHR) and Plasma Arc Melt (PAM) titanium ingots, slabs and electrodes. These melting options allow flexibility in processing raw materials, leading to higher yields, reduced lead times and lower processing costs.

## Nickel-Based Alloys & Specialty Steels

As one of the world's largest U.S. producers of specialty metals, Allegheny Ludlum has worldwide capabilities to supply high quality advanced alloys for use in such components as thrust reversers, exhaust ducting, welded tubing, piping systems, processing vessels and columns.

Our High Technology Alloys melting facilities provide our customers with flexible means of producing cleaner, highly alloyed iron-based and nickel-based alloys. These facilities have a wide range of melt and remelt capabilities—Argon Oxygen Decarburization (AOD), Vacuum Induction Melting (VIM), Vacuum Arc Remelting (VAR) and Electro-Slag Remelting (ESR)—to produce alloy chemistries to meet exacting customer specifications.

We have the flexibility to use our processing equipment interchangeably to produce premium specialty steels, nickel-based, titanium-based, and cobalt-based alloys. Thus, we are a one-stop shop for our customers' needs regardless of alloy, melting process, or product form.



*Photos above, top to bottom*

FGD duct work

Continuous slab caster in Brackenridge, PA

Auger microscope for exacting microscopy

Hot rolling on the strip mill, Brackenridge, PA

**1854** Steel Company organized to operate the Pompton Furnace

**1901** Incorporation of Allegheny Steel & Iron Company

**1924** First patent awarded to Allegheny Steel & Iron

**1938** Merger of Allegheny Steel Company and Ludlum Steel Company creates Allegheny Ludlum Steel Corporation

**1944** High-temperature alloy for aircraft turbines developed, major contribution to the war effort and future space travel

**1955** Allegheny Ludlum first commercialized superalloys melted by a consumable electrode vacuum remelting process

**1956** Major expansion brings all company research work to Brackenridge, PA Technical Center

**1984** Patent issued for AL 29-4C<sup>®</sup> alloy used in residential furnaces

**1985** Patent issued for AL6XN<sup>®</sup> alloy



Photos above, top to bottom

Our electron-beam furnace in Richland, WA is the largest in the U.S. It's able to process up to 8,000 pounds of titanium per hour.

The induction furnaces at Allegheny Ludlum's Houston, PA plant are uniquely capable of reheating titanium slabs and other specialty alloys prior to hot rolling on the Steckel mill.

Allegheny Ludlum titanium bands are precision cold-rolled on a Sendzimir mill.

## A Single Source for High Performance Metals

Allegheny Ludlum is a world leader in the production of flat-rolled titanium-based alloys, nickel-based alloys and premium specialty steels for the aerospace, chemical, petrochemical, power, environmental, automotive and electronic industries. These alloys are available in a variety of product forms including plate, sheet, strip and foil, to meet your unique production requirements.

Because Allegheny Ludlum adheres to strict quality standards and process controls, our metal products offer properties, such as exceptional wear-resistance, corrosion- and heat-resistance, toughness and strength.

## Titanium-Based Alloys

Proven to have the lowest life cycle cost in many applications, titanium complements our stainless steel and nickel-based products, and allows us to offer our customers more material options.

By acquiring Oremet Metallurgical Corporation in 1998, Allegheny Ludlum's parent company, Allegheny Technologies Incorporated, significantly increased its melting capacity and options for titanium. Today, Allegheny Ludlum applies an extensive range of technology and business management resources to manufacturing titanium, and is positioned to provide you with competitive lead times and on-time delivery performance.

## Titanium-Based Alloys

Alloy Alliage Legierung	End Use Utilisation finale Erdverwendung	Composition, nominal wt. % Composition, % pds nominal Zusammensetzung, Nominalgewicht %	Specifications Spécifications Technische Daten
<b>Grade 1</b> UNS-R50250 DIN 3.7025	CPI equipment, industrial components, plate frame heat exchangers.	<b>C</b> 0.1 max <b>Fe</b> 0.2 max <b>H</b> 0.015 max <b>N</b> 0.03 max <b>O</b> 0.18 max <b>Ti</b> bal	ASTM B-265 ASME SB-265
<b>Grade 2</b> UNS-R50400 DIN 3.7035	CPI equipment, condenser tubing, industrial components.	<b>C</b> 0.1 max <b>Fe</b> 0.3 max <b>H</b> 0.015 max <b>N</b> 0.03 max <b>O</b> 0.25 max <b>Ti</b> bal	ASTM B-265 ASME SB-265 AMS 4902
<b>Grade 3</b> UNS-R50550 DIN 3.7055	CPI equipment, heat exchangers, industrial components.	<b>C</b> 0.1 max <b>Fe</b> 0.3 max <b>H</b> 0.015 max <b>N</b> 0.05 max <b>O</b> 0.35 max <b>Ti</b> bal	ASTM B-265 ASME SB-265 AMS 4900
<b>Grade 4</b> UNS-R50700 DIN 3.7065	CPI equipment, industrial components, heat exchangers.	<b>C</b> 0.1 max <b>Fe</b> 0.6 max <b>H</b> 0.015 max <b>N</b> 0.05 max <b>O</b> 0.4 max <b>Ti</b> bal	ASTM B-265 AMS 4901
<b>6-4 (Grade 5)*</b> UNS-R56400 DIN 3.7164/5	Blades, discs, rings, airframe, fasteners, components. Vessels, cases, hubs, forgings. Standard, rotor/ premium grades.	<b>Al</b> 6.5 max <b>C</b> 0.08 max <b>Fe</b> 0.3 max <b>H</b> 0.015 max <b>N</b> 0.05 max <b>O</b> 0.2 max <b>Ti</b> bal <b>V</b> 4.0	ASTM B-265; ASME SB-265 AMS 4911 MIL-T-9046
<b>6-4 ELI*</b> UNS-R56401	Applications requiring excellent fracture toughness and fatigue strength; aircraft, structural components, biomedical.	<b>Al</b> 6.5 max <b>C</b> 0.08 max <b>Fe</b> 0.25 max <b>H</b> 0.015 max <b>N</b> 0.03 max <b>O</b> 0.13 max <b>Ti</b> bal <b>V</b> 4.0	ASTM B-265, F-136; ASME B-265 AMS 4907-4 MIL-T-9046
<b>Grade 7</b> UNS-R52400 DIN 3.7235	Tubing, heat exchangers, CPI equipment.	<b>Ti Grade 2 + 0.2 Pd</b>	ASTM B-265 ASME SB-265
<b>Grade 9</b> UNS-R56320 DIN 3.7195	Tubing, heat exchangers, industrial components.	<b>Al</b> 3.0 <b>C</b> 0.05 max <b>Fe</b> 0.13 <b>H</b> 0.015 max <b>N</b> 0.01 <b>O</b> 0.1 <b>Ti</b> bal <b>V</b> 2.5	ASTM B-265 AMS 4943
<b>Grade 11</b> UNS-R52250 DIN 3.7225	CPI equipment, industrial components, plate frame heat exchangers.	<b>Ti Grade 1 + 0.2 Pd</b>	ASTM B-265
<b>Grade 12</b> UNS-R53400 DIN 3.7105	Tubing, heat exchangers, industrial components, CPI equipment.	<b>Mo</b> 0.3 <b>Ni</b> 0.8 <b>Ti</b> bal	ASTM B-265 ASME SB-265
<b>Grade 16</b> UNS-R52402	CPI equipment, condenser tubing, industrial components.	<b>Ti Grade 2 + 0.05 Pd</b>	ASTM B-265
<b>Grade 17</b> UNS-R52252	CPI equipment, industrial components, plate frame heat exchangers.	<b>Ti Grade 1 + 0.05 Pd</b>	ASTM B-265
<b>Grade 18</b> UNS-R56322	Tubing, heat exchangers, industrial components.	<b>Ti Grade 9 + 0.05 Pd</b>	ASTM B-265

Available in plate, sheet and strip.

\*Available in plate only.

## Nickel-Based Alloys

<b>AL 200/201</b> UNS-N02200/N02201 DIN (2.4066/2.4068)	Containers and piping in caustic soda and food processing plants.	<b>Ni</b> + trace	ASTM B-162 ASME SB-162 AMS 5533 (N02201 only)
<b>AL 400</b> UNS-N04400 DIN (2.4360)	Marine and dilute reducing environments for chemical or refining process equipment, pumps, valves, fittings.	<b>Cu</b> 32.0 <b>Fe</b> 2.5 <b>Ni</b> 63.0	ASTM B-127 ASME SB-127 AMS 4544
<b>AL 600</b> UNS-N06600 DIN (2.4816)	Furnace parts, heat treatment fixtures, chemical and food processing and nuclear reactors.	<b>Cr</b> 15.5 <b>Fe</b> 8.0 <b>Ni</b> 76.0	ASTM B-168 ASME SB-168 AMS 5540
<b>AL 601</b> UNS-N06601 DIN (2.4851)	Heat treat baskets, muffles, retorts.	<b>Al</b> 1.35 <b>Cr</b> 23.0 <b>Fe</b> 14.0 <b>Ni</b> 60.0	ASTM B-168 AMS 5870
<b>AL 800/800H/800AT</b> UNS-N08800/N08810/N08811 DIN (1.4876/1.4876 or 1.4958)	Heat exchangers, process piping, heat treat fixtures, furnace parts, and steam.	<b>Al</b> 0.35 <b>Cr</b> 21.0 <b>Fe</b> 46.0 <b>Ni</b> 32.0 <b>Ti</b> 0.35	ASTM B-409 ASME SB-409 AMS 5871
<b>AL 276</b> UNS-N10276 DIN (2.4819)	Pollution control, chemical processing, pulp & paper products, waste treatment.	<b>Cr</b> 15.5 <b>Fe</b> 6.0 <b>Mo</b> 16.0 <b>Ni</b> 60.0 <b>W</b> 4.0	ASTM B-575 ASME SB-575
<b>AL 22</b> UNS-N06022	Flue-gas desulfurization systems, pulp and paper plants, waste incinerators, sour gas service.	<b>Cr</b> 20.6 <b>Fe</b> 2.5 <b>Mo</b> 13.9 <b>W</b> 2.65 <b>Ni</b> bal	ASTM B-575 ASME SB-575
<b>ALTEMP® 718</b> UNS-N07718 DIN (2.4668)	Aircraft ducting, engine plumbing.	<b>Cb</b> 5.0 <b>Cr</b> 18.0 <b>Fe</b> 18.5 <b>Mo</b> 3.0 <b>Ni</b> bal <b>Ti</b> 1.0	ASTM B-670 AMS 5596 AMS 5597
<b>ALTEMP® 625</b> UNS-N06625 DIN (2.4856)	Jet engine nacelles, engine plumbing, aircraft ducting, recuperators, thrust reversers.	<b>Cb</b> 3.8 <b>Cr</b> 22.0 <b>Fe</b> 4.0 <b>Mo</b> 9.0 <b>Ni</b> bal	ASTM B-443 ASME SB-443 AMS 5599
<b>ALTEMP® HX</b> UNS-N06002 DIN (2.4665)	Jet engine combustion components, combustion cans, heat treating equipment, annular combustion chambers, belts.	<b>Cr</b> 21.0 <b>Fe</b> 18.5 <b>Mo</b> 9.0 <b>Ni</b> bal <b>W</b> 0.5	ASTM B-435 ASME SB-435 AMS 5536
<b>AL 36</b> UNS-K93600 or K93603	Membranes for LNG tankers, cryogenic piping, low expansion alloy for bimetallic strip, mold plates for aircraft structural composite tooling.	<b>Fe</b> bal <b>Ni</b> 36.0	ASTM B-753 ASTM F-1684 MIL-I-23011
<b>AL 42</b> UNS-K94100	Lead frames, color TB electron guns, glass-metal and ceramic-metal seals, transistors.	<b>Fe</b> bal <b>Ni</b> 41.0	ASTM F-30 (42)
<b>AL 4750</b> UNS-K94800 or K95000	Magnetic relay parts, magnetic shielding, pole pieces, specialty motor stators and rotors, electric transformers, magnetic amplifiers.	<b>Fe</b> bal <b>Ni</b> 49.0	ASTM A-753 ASTM B-753
<b>Moly Permalloy</b>	Cores and relay components for high sensitivity ground fault circuit breakers, magnetic shields, and electric transformers.	<b>Fe</b> bal <b>Mo</b> 4.8 <b>Ni</b> 80.0	ASTM A-753 MIL-N-14411

Available in plate, sheet and strip.

\*Tempered

ALTEMP is a registered trademark of ATI Properties, Inc.

Density lb/in<sup>3</sup> (g/cm<sup>3</sup>)  
 Densité livrer/po' (g/cm<sup>3</sup>)  
 Dichte lb/in<sup>3</sup> (g/cm<sup>3</sup>)

Tensile Strength ksi (MPa)  
 Résistance à la traction ksi (MPa)  
 Zugfestigkeit ksi (MPa)

0.2% Yield Strength ksi (MPa)  
 Limite élastique à 0.2% ksi (MPa)  
 0.2% Streckgrenze ksi (MPa)

Elongation, %  
 Allongement, %  
 Dehnung, %

Hardness  
 Dureté  
 Härte

0.163 (4.52)	50 (345)	30 (206)	35	120 BHN
0.163 (4.52)	70 (483)	50 (345)	27	160 BHN
0.163 (4.52)	85 (585)	65 (450)	25	200 BHN
0.163 (4.52)	100 (690)	80 (550)	23	250 BHN
0.160 (4.43)	130 (900)	120 (828)	10	35 Rc
0.160 (4.43)	120 (825)	110 (760)	10	30 Rc
0.163 (4.52)	70 (483)	50 (345)	27	160 BHN
0.162 (4.49)	110 (760)	95 (655)	15	25 Rc
0.163 (4.52)	50 (345)	32 (221)	37	120 BHN
0.163 (4.52)	90 (620)	65 (450)	22	180 BHN
0.163 (4.52)	70 (485)	50 (345)	27	160 BHN
0.163 (4.52)	50 (345)	30 (206)	35	120 BHN
0.163 (4.52)	110 (760)	95 (655)	15	25 Rc

0.322 (8.92)	67 (462)/60 (415)	21 (148)/20 (140)	47/45	45 Rb
0.319 (8.84)	80 (550)	40 (275)	40	70 Rb
0.304 (8.42)	95 (655)	45 (310)	40	80 Rb
0.291 (8.06)	100 (690)	50 (345)	45	85 Rb
0.290 (8.03)	80 (550)/85 (585)	40 (275)/45 (310)	47/45	70 Rb
0.323 (8.95)	120 (825)	60 (415)	55	90 Rb
0.311 (8.62)	105 (724)	50 (345)	67	87 Rb
0.297 (8.23)	ANN. 130 (900) H.T. 195 (1345)	ANN. 65 (450) H.T. 170 (1170)	ANN. 45 H.T. 17	ANN. 95 Rb H.T. 43Rc
0.304 (8.42)	135 (930)	70 (485)	45	95 Rb
0.299 (8.28)	110 (760)	55 (380)	50	90 Rb
0.291 (8.05)	67 (462)	38 (261)	32	75 Rb
0.294 (8.15)	70 (485)	40 (275)	28	55 Rb
0.295 (8.17)	73 (503)	30 (206)	38	55 Rb
0.298 (8.25)	99 (682)*	49 (338)*	32*	80 Rb*

## ALLEGHENY LUDLUM SALES OFFICES

### Plate Mill Plate & Continuous Mill Plate

800-289-7528  
 724-229-3710  
 (FAX) 724-229-3775

### Sheet

800-258-3586  
 724-226-6550  
 (FAX) 724-226-6562

### Standard Strip & Foil

800-777-2822  
 724-845-0440  
 (FAX) 724-845-0691

### Precision Rolled Strip® Products & Foil

800-225-8104  
 508-996-5691  
 (FAX) 508-984-8900

## WORLDWIDE PHONE NUMBERS

### Australia

61-3-9205-9622  
 (FAX) 61-3-9853-9066

### China

86-10-6512-0451  
 (FAX) 86-10-6512-0453

### France

33 (0) 1-55-66-8888  
 (FAX) 33 (0) 1-47-81-8500

### Germany

49 (0) 211-513-5600  
 (FAX) 49 (0) 211-513-56050

### India

91-22-282-6366  
 (FAX) 91-22-283-7288

### Japan

81-3-3239-9080  
 (FAX) 81-3-3239-9021

### Korea

82-2-538-3761  
 (FAX) 82-2-538-3760

### Singapore

65-732-8771  
 (FAX) 65-732-8358

### Taiwan

886-2-2922-2265  
 (FAX) 886-2-2922-2269

### United Kingdom

44 (0) 114-272-0081  
 (FAX) 44 (0) 114-273-1637

[www.alleghenyludlum.com](http://www.alleghenyludlum.com)  
[www.alleghenytechnologies.com](http://www.alleghenytechnologies.com)

Typical annealed mechanical properties at room temperature. Hardness values are for information only. For more detailed product information visit our web sites at [www.alleghenyludlum.com](http://www.alleghenyludlum.com) and [www.alleghenytechnologies.com](http://www.alleghenytechnologies.com)

Data are nominal and should not be construed as maximum or minimum values for specification or for final design. Data on any particular piece of material may vary from those shown herein.

## Specialty Alloys

Alloy Alliage Legierung	End Use Utilisation finale Endverwendung	Composition, nominal wt. % Composition, % pps nominal Zusammensetzung, Nominalgewicht %	Specifications Spécifications Technische Daten
<b>ALTEMP® 286</b> UNS-S66286	Jet engine nacelles (engine pods), jet engine parts and fasteners.	<b>Cr 14.0 Fe bal Mo 1.3 Ni 25.0 Ti 2.1</b>	AMS 5525 AMS 5858 (welding quality)
<b>ALLOY 21-6-9</b> UNS-S21904 DIN (1.4454)	Aircraft hydraulic tubing.	<b>Cr 21.0 Fe bal Mn 9.0 Ni 6.5 N 0.3</b>	ASTM A-666 AMS 5595
<b>AL 825</b> UNS-N08825 DIN (2.4858)	Pollution control and radioactive waste equipment, chemical transport and acid production equipment, pickling equipment, oil/gas well piping.	<b>Cr 21.5 Cu 2.0 Fe bal Mo 3.0 Ni 42.0</b>	ASTM B-424 ASME SB-424
<b>AL-6XN® Alloy</b> UNS-N08367	Condenser tubing, tanks in pulp & paper industry, CPI heat exchangers, sea water resistant.	<b>C .02 Cr 20.5 Fe bal Mo 6.5 Ni 25.0 N 0.2</b>	ASTM B-688 ASME SB-688
<b>AL 15-5</b> UNS-S15500 DIN (1.4545)	Valve parts, fasteners, fittings, air frame parts.	<b>Cr 15.5 Cu 3.4 Fe bal Ni 4.3</b>	ASTM A-693 ASME SA-693 AMS 5862
<b>AL 15-7*</b> UNS-S15700 DIN (1.4532)	Flat springs, bellows, diaphragms, fasteners.	<b>Al 1.0 Cr 15.0 Fe bal Mo 2.5 Ni 7.0</b>	ASTM A-693 ASME SA-693 AMS 5520
<b>AL 17-4</b> UNS-S17400 DIN (1.4548)	Fasteners, air frame parts, valve parts, fittings.	<b>Cr 16.0 Cu 3.5 Fe bal Ni 4.5</b>	ASTM A-693 ASME SA-693 AMS 5604
<b>AL 17-7*</b> UNS-S17700 DIN (1.4568)	Flat springs, bellows, diaphragms, fasteners.	<b>Al 1.2 Cr 17.0 Fe bal Ni 7.0</b>	ASTM A-693 ASME SA-693 AMS 5528 AMS 5529 (cold rolled temper)
<b>AL29-4C® Alloy</b> UNS-S44735	Welded condenser tubing used in seawater in power generation industry and other applications requiring extreme resistance to chloride ion pitting, crevice corrosion and stress corrosion cracking.	<b>Cr 29.0 Fe bal Mo 4.0 Ti+Cb 0.6</b>	ASTM A-240
<b>AL 418*</b> (Greek Ascology)	Engine braces, turbine exhaust components, exhaust struts, stiffeners, ducts.	<b>C 0.19 Cr 12.0 Fe bal Ni 2.0 W 2.5</b>	AMS 5508
<b>AL 20/20CB-3**</b> UNS-N08020 DIN (2.4660)	Flue gas scrubbers, sulphuric acid tanks and racks, process piping, heat exchangers.	<b>Cr 20.0 Cu 3.3 Fe 40.0 Mo 2.2 Ni 33.0</b>	ASTM B-463 ASME SB-463
<b>AL 904L</b> UNS-N08904 DIN (1.4539)	Home efficiency furnace heat exchangers, pulp & paper processing equipment.	<b>Cr 20.5 Cu 1.5 Fe bal Mo 4.5 Ni 24.5</b>	ASTM B-625 ASME SB-625
<b>AL 2205</b> UNS-S31803/S32205 DIN (1.4462)	Pipe, tubing in general corrosion and chloride stress corrosion environments.	<b>Cr 22.0 Fe bal Mo 3.0 Ni 5.5 N 0.16</b>	ASTM A-240 ASME SA-240
<b>AM350*</b> UNS-S35000	Valves, aircraft tubing, bellows, mounts, brackets, ducts.	<b>C 0.08 Cr 16.5 Fe bal Mo 2.8 Ni 4.3</b>	ASTM A-693 ASME SA-693 AMS 5548
<b>E-Brite® Alloy</b> UNS-S44627	Solenoid valves, pressure vessels, coker components, heat exchangers, air preheaters, heat recuperators.	<b>C 0.003 Cr 26.0 Fe bal Mo 1.0</b>	ASTM A-240 ASME SA-240
<b>ALLCORR®</b> UNS-N06110	Chemical processing, oil and gas, petro-chemical processing, FGD, waste incineration.	<b>Cr 30.0 Mo 11.5 W 2.0 Ni bal</b>	ASTM B-755 MRO 175
<b>AL 2003</b> UNS (Applied for)	Pipe, tubing in general corrosion and chloride environments.	<b>Cr 20.0 Ni 3.0 Mo 1.7 N 0.17 Fe bal</b>	ASTM A-240
<b>AL 263</b> UNS-N07263 DIN (2.4650)	Land based gas turbines.	<b>Cr 20.0 Co 20.0 Mo 5.8 Ti 2.2 Ni bal</b>	AMS 5872 AMS 5886
<b>AL 750</b> UNS-N07750 DIN (2.4669)	Gas turbine components, high strength fasteners.	<b>Cr 15.5 Fe 7.0 Ti 2.5 Cb 1.0 Ni bal</b>	ASTM B-637 ASME SB-637 AMS 5598

Available in plate, sheet and strip.

\*Available in sheet and strip only

\*\*Registered trademark of Carpenter Technology

ALTEMP, AL-6XN, AL 29-4C, E-Brite and ALLCORR  
are registered trademarks of ATI Properties, Inc.

Density lb/in<sup>3</sup> (g/cm<sup>3</sup>)  
 Densité livrer/po<sup>3</sup> (g/cm<sup>3</sup>)  
 Dichte lb/in<sup>3</sup> (g/cm<sup>3</sup>)

Tensile Strength ksi. (MPa)  
 Résistance à la traction ksi. (MPa)  
 Zugfestigkeit ksi. (MPa)

0.2% Yield Strength ksi. (MPa)  
 Limite élastique à 0.2% ksi. (MPa)  
 0.2% Streckgrenze ksi. (MPa)

Elongation, %  
 Allongement, %  
 Dehnung, %

Hardness  
 Dureté  
 Härte

0.288 (7.98)	ANN. 95 (655) H.T. 164 (1130)	ANN. 50 (345) H.T. 108 (745)	ANN. 40 H.T. 25	ANN. 85 Rb —
0.290 (8.03)	115 (795)	65 (450)	45	95 Rb
0.294 (8.14)	100 (690)	50 (345)	40	85 Rb
0.291 (8.06)	110 (760)	55 (380)	45	90 Rb
0.281 (7.78)	150 (1030)	110 (760)	10	33 Rc
0.282 (7.81)	130 (900)	55 (380)	30	88 Rb
0.280 (7.76)	150 (1030)	110 (760)	8	33 Rc
0.282 (7.81)	120 (830)	50 (345)	35	85 Rb
0.277 (7.67)	95 (655)	75 (520)	22	90 Rb
0.284 (7.87)	130 (900)	105 (725)	15	25 Rc
0.292 (8.09)	95 (655)	55 (380)	38	85 Rb
0.287 (7.95)	90 (620)	50 (345)	40	80 Rb
0.285 (7.90)	125 (860)	90 (620)	30	22 Rc
0.282 (7.81)	170 (1175)	70 (485)	30	100 Rb
0.280 (7.76)	80 (550)	60 (415)	25	83 Rb
0.302 (8.33)	105 (725)	50 (345)	55	90 Rb
0.279 (7.72)	105 (725)	75 (515)	40	20 Rc
0.302 (8.33)	H.T. 160 (1105)	H.T. 92 (635)	H.T. 35	H.T. 26 Rc
0.299 (8.28)	ANN. 115 (795) H.T. 180 (1245)	ANN. 60 (415) H.T. 120 (825)	ANN. 45 H.T. 20	— —

Typical annealed mechanical properties at room temperature. Hardness values are for information only.  
 For more detailed product information visit our web sites at [www.alleghenyludlum.com](http://www.alleghenyludlum.com) and [www.alleghenytechnologies.com](http://www.alleghenytechnologies.com)

Data are nominal and should not be construed as maximum or minimum values for specification or for final design. Data on any particular piece of material may vary from those shown herein.

## ALLEGHENY LUDLUM SALES OFFICES

### Plate Mill Plate & Continuous Mill Plate

800-289-7528  
 724-229-3710  
 (FAX) 724-229-3775

### Sheet

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# Allegheny Technologies' Specialty Metals Companies

COMPANY	DESCRIPTION	PHONE
<b>Allegheny Ludlum</b>	Manufactures high performance alloys including stainless steel, nickel-based alloys, titanium and titanium-based alloys. The company also produces grain-oriented silicon electrical steel products and tool steel plate. It produces a broad selection of grades, sizes and finishes designed to meet international specifications and provides technical support for material selection.	<b>800-258-3586</b> <b>724-226-6550</b>
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<b>Allvac</b>	Manufactures high performance alloys including nickel-, cobalt-, titanium-, and iron-based alloys and specialty steels. Product forms include ingots, forging billet, extrusion billet, round forging bar, round machining bar, custom rolled shapes, rod, redraw stocks, drawn coil and drawn rod.	<b>800-841-5491</b> <b>704-289-4511</b>
<b>Allvac Ltd</b>		<b>44-114-272-0081</b>
<b>Wah Chang</b>	Manufactures high performance alloys including pure and alloyed zirconium, vanadium, titanium, niobium and hafnium alloys. Product forms include ingot, slab, billet, bar, rod, tube, pipe, wire, sheet, strip, foil, forgings, castings, sponge and powder.	<b>888-926-4211</b> <b>541-967-9000</b>



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